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David Brady

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Tessera North America, Inc.

c/o Lee & Morse, P.C.

3141 FAIRVIEW PARK DRIVE, SUITE 500

FALLS CHURCH, VA 22042

EXAMINER

KHAN, USMAN A

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/784,472	Applicant(s) BRADY ET AL.	
	Examiner USMAN KHAN	Art Unit 2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 April 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-40 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 04/12/2010, with respect to the rejection(s) of claim(s) 1 - 40 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made for claims 1 - 40. Since this is a new ground of rejection, which was not done because of an amendment, this action is non-final.

Drawings

2. The drawings are objected to because figures 1 - 3 do not contain a descriptive legend and therefore does not enable a complete understanding of the drawing. For example, upon viewing Figures 1 - 3 as originally filed, one having ordinary skill in the art would not be able to determine what is being depicted. Though described as a block diagram of digital still camera, it is insufficient to determine what is disclosed without extensive reading of the specification. As a correction, it is suggested that brief descriptive text or a separate legend commensurate with the specification be used in addition to the reference numeral.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure

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is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: reference numeral 30 is not shown in the drawings. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims **1 - 40** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 1, 12, and 30 claim "an output of the plurality of detectors together representing an input image multiplied by a selected transform matrix." The statement of "multiplied by a selected transform matrix" is unclear because the limitation does not set forth clearly the limitation of the claims whether each individual signal from each detector is multiplied by the selected transform matrix or if the summed total signal as a whole is multiplied by the selected transform matrix.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 30, 31, 33, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanida et al. (US patent No. 7,009,652) in view of Heller et al. (US patent No. 5,355,222).

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Regarding **claim 30**, Tanida et al. teaches an imaging system (column 2 lines 46 – 58), comprising: an array of lenses (figure 1 item 1 microlens array with plurality of microlenses 1a; also column 3 lines 52 – column 4 line 9); a plurality of detectors for each lens (figure 1 item 3 photosensitive element array with plurality of photosensitive elements 3a; also column 3 lines 52 – column 4 line 9), the detectors being on an image plane of the imaging system (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60); and a corresponding plurality of multiple image blocking portions provided for each detector (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60), a pattern of multiple image blocking portions being substantially the same for the plurality of detectors associated with a corresponding lens (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60), the plurality of multiple image blocking portions being between the lens and the plurality of detectors (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60), wherein at least two patterns of multiple image blocking portions associated with different lenses are different (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60), an output of the plurality of detectors together representing an input image multiplied by a selected transform matrix (column 6 line 18 – 24; inverse matrix method and column 3 lines 63 *et seq.* processing unit U).

However, Tanida et al. fails to teach that each image blocking portion being smaller than a detector. Heller et al., on the other hand teaches that the pixels are sub-pixels.

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More specifically, Heller et al. teaches that each image blocking portion being smaller than a detector (figures 2, 4, 7, 7A and 8).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Heller et al. with the teachings of Tanida et al. because in column 2 lines 29 - 35 Heller et al. teaches that the invention compensates for the effect of perspective viewing hence improving the image quality.

Regarding **claim 31**, as mentioned above in the discussion of claim 29 Tanida et al. in view of Heller et al. teach all of the limitations of the parent claim.

However, Tanida et al. fails to teach that wherein one lens of the array of lenses has no multiple image blocking portions associated therewith. Heller et al., on the other hand teaches that wherein one lens of the array of lenses has no multiple image blocking portions associated therewith.

More specifically, Heller et al. teaches that the wherein one lens of the array of lenses has no multiple image blocking portions associated therewith (Figures 2, 4 and 8 item A(0)).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Heller et al. with the teachings of Tanida et al. because in column 2 lines 9 *et seq.* Heller et al. teaches that this method will increase sensitivity of the system.

Regarding **claim 33**, as mentioned above in the discussion of claim 30, Tanida et al. in view of Heller et al. teaches all of the limitations of the parent claim.

However, Tanida et al. fails to teach that each image blocking portion is smaller than a detector in both directions. Heller et al., on the other hand teaches that each image blocking portion is smaller than a detector in both directions.

More specifically, Heller et al. teaches that each image blocking portion is smaller than a detector in both directions (figures 2, 4, 7, 7A and 8).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Heller et al. with the teachings of Tanida et al. because in column 2 lines 29 - 35 Heller et al. teaches that the invention compensates for the effect of perspective viewing hence improving the image quality.

Regarding **claim 34**, as mentioned above in the discussion of claim 33, Tanida et al. in view of Heller et al. teaches all of the limitations of the parent claim. Additionally, Heller et al. teaches that each image blocking portion in a pattern has equal dimensions in both directions (figures 2, 4, 7, 7A and 8).

6. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanida et al. (US patent No. 7,009,652) in view of Heller et al. (US patent No. 5,355,222) and in further view of Official Notice.

Regarding claim **32**, as mentioned above in the discussion of claim 30, Tanida et al. in view of Heller et al. teach all of the limitations of the parent claim.

However, Tanida et al. in view of Heller et al. fail to teach that the selected transform matrix is a Hadamard matrix.

The examiner takes Official Notice that it is old and well known in the art to use Hadamard matrix when capturing an image.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a Hadamard matrix to correct for errors and the very same matrix which is used for deriving the transformed components of the input video signal can be used for reconverting such transformed components back into the original video signal.

7. Claims 1 – 4, 6, 9 - 13, 15 – 19, 21 – 29, 36 – 37, and 39 - 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanida et al. (US patent No. 7,009,652) in view of Mendlovic et al. (US patent No. 7,003,177) and in further view of Heller et al. (US patent No. 5,355,222).

Regarding **claim 1**, Tanida et al. teaches an imaging system (column 2 lines 46 – 58), comprising: an array of lenses (figure 1 item 1 microlens array with plurality of microlenses 1a; also column 3 lines 52 – column 4 line 9); a plurality of detectors for each lens (figure 1 item 3 photosensitive element array with plurality of photosensitive elements 3a; also column 3 lines 52 – column 4 line 9), the detectors being on an image plane of the imaging system (figure 1 item 3 photosensitive element array with

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plurality of photosensitive elements 3a; also column 3 lines 52 – column 4 line 9); and a corresponding plurality of focal plane coding elements (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60), a focal plane coding element provided for each detector each focal plane coding element having multiple pixel resolution elements (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60, a pattern of the multiple pixels resolution elements being substantially the same for the plurality of detectors associated with a corresponding lens (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60), the plurality of focal plane coding elements being between the lens and plurality of detectors (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60), wherein at least two of the focal plane coding elements provided for the plurality of detectors associated with different lenses have different patterns of multiple pixel resolution elements (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60 each of the adjacent items of 4a are polarized in a different direction);

an output of the plurality of detectors together representing an input image multiplied by a selected transform matrix (column 6 line 18 – 24; inverse matrix method and column 3 lines 63 *et seq.* processing unit U).

However, Tanida et al. fails to teach that the pixels are sub-pixels. Mendlovic et al., on the other hand teaches that the pixels are sub-pixels.

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More specifically, Mendlovic et al. teaches that that the pixels are sub-pixels (column 2 line 38 – 45, column 6 lines 47 *et seq.*, column 13 lines 3 *et seq.*, and column 14 lines 8 *et seq.*; sub-pixel).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Mendlovic et al. with the teachings of Tanida et al. because in column 2 line 27 – column 3 line 26 Mendlovic et al. teaches that using the CCD configuration of the invention will improve the image quality.

However, Tanida et al. in view of Mendlovic et al. fail to teach that each image blocking portion being smaller than a detector. Heller et al., on the other hand teaches that the pixels are sub-pixels.

More specifically, Heller et al. teaches that each image blocking portion being smaller than a detector (figures 2, 4, 7, 7A and 8).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Heller et al. with the teachings of Tanida et al. in view of Mendlovic et al. because in column 2 lines 29 - 35 Heller et al. teaches that the invention compensates for the effect of perspective viewing hence improving the image quality.

Regarding **claim 2**, as mentioned above in the discussion of claim 1, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that the focal plane-

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coding element provides pixel shifted multiple images on each sensor pixel (figure 5 and column 6 lines 5 – 17).

However, Tanida et al. in view of Heller et al. fails to teach that the pixels are sub-pixels. Mendlovic et al., on the other hand teaches that the pixels are sub-pixels.

More specifically, Mendlovic et al. teaches that that the pixels are sub-pixels (column 2 line 38 – 45, column 6 lines 47 *et seq.*, column 13 lines 3 *et seq.*, and column 14 lines 8 *et seq.*; sub-pixel).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Mendlovic et al. with the teachings of Tanida et al. and in further view of Heller et al. because in column 2 line 27 – column 3 line 26 Mendlovic et al. teaches that using the CCD configuration of the invention will improve the image quality.

Regarding **claim 3**, as mentioned above in the discussion of claim 1, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that the focal plane-coding element is an apertured mask (figure 1, item 2 partition wall layer with partition layers 2a).

Regarding **claim 4**, as mentioned above in the discussion of claim 1, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the

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limitations of the parent claim. Additionally, Tanida et al. teaches that the imaging system further comprising color filters (column 11 lines 24 – 38).

Regarding **claim 6**, as mentioned above in the discussion of claim 1, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches a birefringent structure adjacent the focal plane-coding element (figure 2).

Regarding **claim 9**, as mentioned above in the discussion of claim 1, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches at least one sensor pixel receives light from more than one lens of the array of lenses (figure 11, 12A, and 12B).

Regarding **claim 10**, as mentioned above in the discussion of claim 1, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches a processor receiving the outputs of the sensor pixels and multiplying the outputs by an inverse of the selected transform matrix (column 6 line 18 – 24; inverse matrix method and column 3 lines 63 *et seq.* processing unit U).

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Regarding **claim 11**, as mentioned above in the discussion of claim 10, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that the processor reconstructs an image from the outputs, a number of image pixels in the image being greater than the plurality of sensor pixels (column 2 lines 46 – 58).

Regarding **claim 12**, Tanida et al. teaches an imaging system (column 2 lines 46 – 58), comprising: an array of lenses (figure 1 item 1 microlens array with plurality of microlenses 1a; also column 3 lines 52 – column 4 line 9); a plurality of detectors for each lens (figure 1 item 3 photosensitive element array with plurality of photosensitive elements 3a; also column 3 lines 52 – column 4 line 9); a corresponding plurality of detectors (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60), a filter provided for each detector (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60), each filter having multiple pixel resolution elements (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60), a pattern of the multiple pixels resolution elements being substantially the same for the plurality of detectors associated with a corresponding lens (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60), and providing a pixel shifted multiple image on each sensor pixel (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60); and a processor receiving outputs from each detector and reconstructing an image (column 6 line 18 – 24; inverse matrix

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method and column 3 lines 63 *et seq.* processing unit U), together representing an input image multiplied by a selected transform matrix (column 6 line 18 – 24; inverse matrix method and column 3 lines 63 *et seq.* processing unit U), a number of image pixels in the image being greater than the plurality of detectors (column 2 lines 46 – 58).

However, Tanida et al. fails to teach that the pixels are sub-pixels. Mendlovic et al., on the other hand teaches that the pixels are sub-pixels.

More specifically, Mendlovic et al. teaches that that the pixels are sub-pixels (column 2 line 38 – 45, column 6 lines 47 *et seq.*, column 13 lines 3 *et seq.*, and column 14 lines 8 *et seq.*; sub-pixel).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Mendlovic et al. with the teachings of Tanida et al. because in column 2 line 27 – column 3 line 26 Mendlovic et al. teaches that using the CCD configuration of the invention will improve the image quality.

However, Tanida et al. in view of Mendlovic et al. fail to teach that each image blocking portion being smaller than a detector. Heller et al., on the other hand teaches that the pixels are sub-pixels.

More specifically, Heller et al. teaches that each image blocking portion being smaller than a detector (figures 2, 4, 7, 7A and 8).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Heller et al. with the teachings of Tanida et al. in view of Mendlovic et al. because in column 2 lines 29 - 35

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Heller et al. teaches that the invention compensates for the effect of perspective viewing hence improving the image quality.

Regarding **claim 13**, as mentioned above in the discussion of claim 12, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches a birefringent structure plurality of filters ((column 2 lines 46 – 58; also [figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also, column 6 lines 25 – 60] and/or [figure 15 item 7 diffraction grating; also column 10 lines 57 *et seq.*]).

Regarding **claim 15**, as mentioned above in the discussion of claim 12, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches at least one sensor pixel receives light from more than one lens of the array of lenses (figure 11, 12A, and 12B).

Regarding **claim 16**, as mentioned above in the discussion of claim 12, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that the focal plane-coding element is an apertured mask (figure 1, item 2 partition wall layer with partition layers 2a).

Regarding **claim 17**, as mentioned above in the discussion of claim 1, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that the focal plane coding element is closer to the plurality of sensor pixels than to the array of lenses (figure 8 when the array 4 is places in figure 1).

Regarding **claim 18**, as mentioned above in the discussion of claim 12, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that the focal plane coding element is between the plurality of sensor pixels than to the array of lenses (figure 8 when the array 4 is places in figure 1).

Regarding **claim 19**, as mentioned above in the discussion of claim 18, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that the focal plane coding element is closer to the plurality of sensor pixels than to the array of lenses (figure 8 when the array 4 is places in figure 1).

Regarding **claim 21**, as mentioned above in the discussion of claim 1, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that a majority of patterns of multiple pixel resolution elements are different from one another (figure 8, array 4).

However, Tanida et al. in view of Heller et al. fail to teach that the pixels are sub-pixels. Mendlovic et al., on the other hand teaches that the pixels are sub-pixels.

More specifically, Mendlovic et al. teaches that that the pixels are sub-pixels (column 2 line 38 – 45, column 6 lines 47 *et seq.*, column 13 lines 3 *et seq.*, and column 14 lines 8 *et seq.*; sub-pixel also figure 11).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Mendlovic et al. with the teachings of Tanida et al. in view of Heller et al. because in column 2 line 27 – column 3 line 26 Mendlovic et al. teaches that using the CCD configuration of the invention will improve the image quality.

Regarding **claim 22**, as mentioned above in the discussion of claim 1, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that a majority of patterns of multiple pixel resolution elements block substantially half of incident light (figure 8, array 4).

However, Tanida et al. in view of Heller et al. fail to teach that the pixels are sub-pixels. Mendlovic et al., on the other hand teaches that the pixels are sub-pixels.

More specifically, Mendlovic et al. teaches that that the pixels are sub-pixels (column 2 line 38 – 45, column 6 lines 47 *et seq.*, column 13 lines 3 *et seq.*, and column 14 lines 8 *et seq.*; sub-pixel).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Mendlovic et al. with the teachings of Tanida et al. because in column 2 line 27 – column 3 line 26 Mendlovic et al. teaches that using the CCD configuration of the invention will improve the image quality.

Regarding **claim 23**, as mentioned above in the discussion of claim 1, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that each pattern of multiple pixel resolution elements includes a plurality of apertures (figure 8, array 4).

However, Tanida et al. in view of Heller et al. fail to teach that the pixels are sub-pixels. Mendlovic et al., on the other hand teaches that the pixels are sub-pixels.

More specifically, Mendlovic et al. teaches that the pixels are sub-pixels (column 2 line 38 – 45, column 6 lines 47 *et seq.*, column 13 lines 3 *et seq.*, and column 14 lines 8 *et seq.*; sub-pixel).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Mendlovic et al. with the teachings of Tanida et al. in view of Heller et al. because in column 2 line 27 – column 3 line 26 Mendlovic et al. teaches that using the CCD configuration of the invention will improve the image quality.

Regarding **claim 24**, as mentioned above in the discussion of claim 1, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that at least one pattern of multiple pixel resolution elements transmits substantially all incident light (figure 8 item 4, Tanida et al. teaches that some of the patterns will be transmitting all light through).

However, Tanida et al. in view of Heller et al. fail to teach that the pixels are sub-pixels. Mendlovic et al., on the other hand teaches that the pixels are sub-pixels.

More specifically, Mendlovic et al. teaches that that the pixels are sub-pixels (column 2 line 38 – 45, column 6 lines 47 *et seq.*, column 13 lines 3 *et seq.*, and column 14 lines 8 *et seq.*; sub-pixel).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Mendlovic et al. with the teachings of Tanida et al. in view of Heller et al. because in column 2 line 27 – column 3 line 26 Mendlovic et al. teaches that using the CCD configuration of the invention will improve the image quality.

Regarding **claim 25**, as mentioned above in the discussion of claim 12, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that a majority of patterns of multiple pixel resolution elements are different from one another (figure 8, array 4).

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However, Tanida et al. in view of Heller et al. fail to teach that the pixels are sub-pixels. Mendlovic et al., on the other hand teaches that the pixels are sub-pixels.

More specifically, Mendlovic et al. teaches that that the pixels are sub-pixels (column 2 line 38 – 45, column 6 lines 47 *et seq.*, column 13 lines 3 *et seq.*, and column 14 lines 8 *et seq.*; sub-pixel).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Mendlovic et al. with the teachings of Tanida et al. in view of Heller et al. because in column 2 line 27 – column 3 line 26 Mendlovic et al. teaches that using the CCD configuration of the invention will improve the image quality.

Regarding **claim 26**, as mentioned above in the discussion of claim 12, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that a majority of patterns of multiple pixel resolution elements block substantially half of incident light (figure 8, array 4).

However, Tanida et al. in view of Heller et al. fail to teach that the pixels are sub-pixels. Mendlovic et al., on the other hand teaches that the pixels are sub-pixels.

More specifically, Mendlovic et al. teaches that that the pixels are sub-pixels (column 2 line 38 – 45, column 6 lines 47 *et seq.*, column 13 lines 3 *et seq.*, and column 14 lines 8 *et seq.*; sub-pixel).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Mendlovic et al. with the teachings of Tanida et al. in view of Heller et al. because in column 2 line 27 – column 3 line 26 Mendlovic et al. teaches that using the CCD configuration of the invention will improve the image quality.

Regarding **claim 27**, as mentioned above in the discussion of claim 12, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that each pattern of multiple pixel resolution elements includes a plurality of apertures (figure 8, array 4).

However, Tanida et al. in view of Heller et al. fail to teach that the pixels are sub-pixels. Mendlovic et al., on the other hand teaches that the pixels are sub-pixels.

More specifically, Mendlovic et al. teaches that the pixels are sub-pixels (column 2 line 38 – 45, column 6 lines 47 *et seq.*, column 13 lines 3 *et seq.*, and column 14 lines 8 *et seq.*; sub-pixel).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Mendlovic et al. with the teachings of Tanida et al. in view of Heller et al. because in column 2 line 27 – column 3 line 26 Mendlovic et al. teaches that using the CCD configuration of the invention will improve the image quality.

Regarding **claim 28**, as mentioned above in the discussion of claim 12, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that at least one pattern of multiple pixel resolution elements transmits substantially all incident light (figure 8 item 4, Tanida et al. teaches that some of the patterns will be transmitting all light through).

However, Tanida et al. in view of Heller et al. fail to teach that the pixels are sub-pixels. Mendlovic et al., on the other hand teaches that the pixels are sub-pixels.

More specifically, Mendlovic et al. teaches that that the pixels are sub-pixels (column 2 line 38 – 45, column 6 lines 47 *et seq.*, column 13 lines 3 *et seq.*, and column 14 lines 8 *et seq.*; sub-pixel).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Mendlovic et al. with the teachings of Tanida et al. in view of Heller et al. because in column 2 line 27 – column 3 line 26 Mendlovic et al. teaches that using the CCD configuration of the invention will improve the image quality.

Regarding **claim 29**, as mentioned above in the discussion of claim 12, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches wherein color filters serve as pixel resolution elements (column 11 lines 24 – 38).

However, Tanida et al. in view of Heller et al. fail to teach that the pixels are sub-pixels. Mendlovic et al., on the other hand teaches that the pixels are sub-pixels.

More specifically, Mendlovic et al. teaches that that the pixels are sub-pixels (column 2 line 38 – 45, column 6 lines 47 *et seq.*, column 13 lines 3 *et seq.*, and column 14 lines 8 *et seq.*; sub-pixel).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Mendlovic et al. with the teachings of Tanida et al. in view of Heller et al. because in column 2 line 27 – column 3 line 26 Mendlovic et al. teaches that using the CCD configuration of the invention will improve the image quality.

Regarding **claim 36**, as mentioned above in the discussion of claim 1, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that each image blocking portion is smaller than a detector in both directions (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60; the plurality of filters 4a can be broken down as each filter 4a including a plurality of polarizing beam splitters).

Regarding **claim 37**, as mentioned above in the discussion of claim 36, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that each image

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blocking portion in a pattern has equal dimensions in both directions (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60; the plurality of filters 4a can be broken down as each filter 4a including a plurality of polarizing beam splitters).

Regarding **claim 39**, as mentioned above in the discussion of claim 12, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that each image blocking portion is smaller than a detector in both directions (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60; the plurality of filters 4a can be broken down as each filter 4a including a plurality of polarizing beam splitters).

Regarding **claim 40**, as mentioned above in the discussion of claim 39, Tanida et al. in view of Mendlovic et al. and in further view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that each image blocking portion in a pattern has equal dimensions in both directions (figure 8 item 4 polarizing filter array with plurality of polarizing filters 4a; also column 6 lines 25 – 60; the plurality of filters 4a can be broken down as each filter 4a including a plurality of polarizing beam splitters).

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8. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanida et al. (US patent No. 7,009,652) in view of Mendlovic et al. (US patent No. 7,003,177) in view of Heller et al. (US patent No. 5,355,222) and further in view of Bills (US patent No. 6,366,319).

Regarding **claim 5**, as mentioned above in the discussion of claim 1 Tanida et al. in view of Mendlovic et al. in view of Heller et al. teach all of the limitations of the parent claim.

However, Tanida et al. in view of Mendlovic et al. fail to teach that the color filters are integral with the focal plane-coding element. Bills, on the other hand teaches that the color filter is adjoined to another element in the focal plane.

More specifically, Bills teaches that the color filter is adjoined to a focal plane array (FPA) located in the focal plane (Figures 1, 2A, 6, and 7; items 105 and 107; Also, Abstract; Also, column 2 lines 29 - 37).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Bills with the teachings of Tanida et al. in view of Mendlovic et al. in view of Heller et al. because in column 2 lines 29 – 37 Bills teaches that this mosaics attempt to match the wavelength-dependent sensitivity of the human eye by including a larger percentage of green pixels than red and blue pixels which in turn will produce a more natural image. Also the combination of the color filter is adjoined to a focal plane array will produce a simpler device which will reduce size by not requiring the two components at two different sections of the camera.

9. Claims 7 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanida et al. (US patent No. 7,009,652) in view of Mendlovic et al. (US patent No. 7,003,177) in view of Heller et al. (US patent No. 5,355,222) and further in view of Meyers (US patent No. 6,137,535).

Regarding **claim 7**, as mentioned above in the discussion of claim 1 Tanida et al. in view of Mendlovic et al. in view of Heller et al. teach all of the limitations of the parent claim.

However, Tanida et al. in view of Mendlovic et al. fail to teach a corresponding plurality of focusing lenses, a focusing lens between the focal plane encoding element and a corresponding sensor pixel. Meyers, on the other hand teaches a corresponding plurality of focusing lenses, a focusing lens between the focal plane encoding element and a corresponding sensor pixel.

More specifically, Meyers teaches a corresponding plurality of focusing lenses, a focusing lens between the focal plane encoding element and a corresponding sensor pixel (figure 2; items 72, 10, and 24).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Meyers with the teachings of Tanida et al. in view of Mendlovic et al. in view of Heller et al. because in column 3 lines 46 - 55 Meyers teaches that by use of the invention an extremely compact digital camera with a lenslet array in close proximity to a photodetector array is formed. Due to the larger sub-image size a reduced number of lenslets are needed to construct the full

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image. By utilizing the space between sub-groups of photodetectors for signal processing electronics, the digital camera can be formed on a single substrate. In addition, a large high-resolution sensor can be synthesized by the use of sub-groups of photodetectors.

Regarding **claim 14**, as mentioned above in the discussion of claim 12 Tanida et al. in view of Mendlovic et al. in view of Heller et al. teach all of the limitations of the parent claim.

However, Tanida et al. in view of Mendlovic et al. in view of Heller et al. fail to teach a corresponding plurality of focusing lenses, a focusing lens between the filter and a corresponding sensor pixel. Meyers, on the other hand teaches a corresponding plurality of focusing lenses, a focusing lens between the filter and a corresponding sensor pixel.

More specifically, Meyers teaches a corresponding plurality of focusing lenses, a focusing lens between the focal plane encoding element and a corresponding sensor pixel (figure 2; items 72, 10, and 24).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Meyers with the teachings of Tanida et al. in view of Mendlovic et al. in view of Heller et al. because in column 3 lines 46 - 55 Meyers teaches that by use of the invention an extremely compact digital camera with a lenslet array in close proximity to a photodetector array is formed. Due to the larger sub-image size a reduced number of lenslets are needed to construct the full

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image. By utilizing the space between sub-groups of photodetectors for signal processing electronics, the digital camera can be formed on a single substrate. In addition, a large high-resolution sensor can be synthesized by the use of sub-groups of photodetectors.

10. Claims 8, 20, 35, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanida et al. (US patent No. 7,009,652) in view of Mendlovic et al. (US patent No. 7,003,177) in view of Heller et al. (US patent No. 5,355,222) and further in view of Official Notice.

Regarding **8 and 20**, as mentioned above in the discussion of claim 1 and 12 respectively, Tanida et al. in view of Mendlovic et al. in view of Heller et al. teach all of the limitations of the parent claim. Additionally, Tanida et al. teaches that the columns and rows can be varied (column 7 lines 24 – 40)

However, Tanida et al. in view of Mendlovic et al. in view of Heller et al. fail to teach that the selected transform matrix has fewer rows than columns.

The examiner takes Official Notice that it is old and well known in the art to use matrices of different sizes.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a matrix with fewer rows than columns to have a wide angle image.

Regarding claims **35, and 38**, as mentioned above in the discussion of claims 1 and 12 respectively, Tanida et al. in view of Mendlovic et al. in view of Heller et al. teach all of the limitations of the parent claim.

However, Tanida et al. in view of Mendlovic et al. in view of Heller et al. fail to teach that the selected transform matrix is a Hadamard matrix.

The examiner takes Official Notice that it is old and well known in the art to use Hadamard matrix when capturing an image.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a Hadamard matrix to correct for errors and the very same matrix which is used for deriving the transformed components of the input video signal can be used for reconverting such transformed components back into the original video signal.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to USMAN KHAN whose telephone number is (571)270-1131. The examiner can normally be reached on Mon-Fri 6:45-3:15.

12. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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13. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Usman Khan/
Usman Khan
07/09/2010
Patent Examiner

/Jason Chan/

Supervisory Patent Examiner, Art Unit 2622